What is claimed is:

1.   An exposure method for forming a predetermined image on a substrate by using an optical system which radiates an exposure light beam onto the substrate and a substrate stage which relatively moves the substrate with respect to the optical system, wherein a surface of the substrate and an image plane of the optical system are set to be in a predetermined positional relationship in at least a part of an area in an exposure area defined by the optical system, the method comprising the steps of:

measuring a height of the surface of the substrate at a measuring point disposed in front of the part of the area in the relative movement direction; and

setting the positional relationship to perform exposure on the basis of information about the measured height of the surface of the substrate and information about an inclination angle of a running surface of the substrate stage.

2.   The exposure method according to claim 1, wherein the measuring point is set in front of the exposure area in the relative movement direction.

3.   The exposure method according to claim 1, wherein the information about the height of the surface of the substrate is measured during a period in which the substrate

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is relatively moved with respect to the optical system while radiating the exposure light beam onto the substrate.

4.   The exposure method according to claim 1, further comprising a step of measuring a value concerning the inclination angle of the running surface of the substrate stage.

5.   The exposure method according to claim 4, wherein:
       the value concerning the inclination angle of the running surface of the substrate stage is a pitching amount of the substrate stage with respect to the relative movement direction of the substrate; and
       the exposure is performed while setting the surface of the substrate and the image plane of the optical system to be in the predetermined positional relationship in the exposure area of the optical system on the basis of a result of prediction of a variation amount concerning the height of the surface of the substrate based on a result of measurement of the pitching amount, and the measured height of the surface of the substrate.

6.   The exposure method according to claim 1, further comprising the step of:
       using a fiducial member having good flatness arranged on the substrate stage to measure a height of a surface of the

fiducial member at a plurality of positions within a movement

stroke of the substrate stage, and storing a result of

measurement, wherein:

the value concerning the inclination angle of the

running surface of the substrate stage is calculated on the

basis of a stored value.

7.   The exposure method according to claim 6, wherein

the fiducial member is detachable to an apparatus which

performs the exposure, and is commonly used for a plurality

of exposure apparatuses.

8.   The exposure method according to claim 6, wherein

the fiducial member is supported at three points with respect

to the apparatus.

9.   The exposure method according to claim 1, wherein

the predetermined image is an image obtained by projecting a

pattern which is formed on a mask and is used for transfer.

10.   The exposure method according to claim 1, wherein a

plurality of measuring points for measuring the height of the

surface of the substrate are provided in a direction (X

direction) substantially perpendicular to the relative

movement direction.

11. The exposure method according to claim 10, further comprising a step of controlling an inclination angle of the substrate with respect to the relative movement direction.

12. An exposure method for forming a predetermined image on a substrate using an optical system which radiates an exposure light beam onto the substrate and a substrate stage which relatively moves the substrate with respect to the optical system, the method comprising the steps of:

measuring at least one of a rolling amount of the substrate stage, a pitching amount of the substrate stage, and a displacement amount of the substrate stage in an optical axis direction of the optical system at a plurality of positions within a movement stroke of the substrate stage using a fiducial member having good flatness arranged on the substrate stage, and storing a result of measurement; and

correcting at least one of a running direction of the substrate stage in and a height of a surface of the substrate on the basis of the result of measurement during exposure for the substrate.

13. The exposure method according to claim 12, wherein the fiducial member is detachable with respect to the substrate stage, and is commonly used for a plurality of exposure apparatuses which perform the exposure respectively.

14. The exposure method according to claim 13, wherein the fiducial member is supported at three points with respect to the apparatus.

15. The exposure method according to claim 12, further comprising a step of:

determining and storing a variation value of the pitching amount and a variation value of the rolling amount from the result of measurement of the rolling amount of the substrate stage, the pitching amount of the substrate stage, and the displacement amount of the substrate stage in the optical axis direction of the optical system, wherein:

the rolling amount of the substrate stage, which is detected during the exposure for the substrate, is corrected on the basis of the variation value of the rolling amount; and

the pitching amount of the substrate stage, which is detected during the exposure for the substrate, is corrected on the basis of the variation value of the pitching amount.

16. The exposure method according to claim 12, further comprising a step of:

measuring straightness of the substrate stage in the running direction using a fiducial mark formed on the fiducial member arranged on the substrate stage, wherein:

any discrepancy of the substrate stage in the running

direction is corrected during the exposure for the substrate on the basis of a result of measurement of the straightness.

17. The exposure method according to claim 12, wherein the predetermined image is an image obtained by projecting a pattern which is formed on a mask and is used for transfer.

18. An exposure method for forming a predetermined image on a substrate using an optical system which radiates an exposure light beam onto the substrate and a substrate stage which relatively moves the substrate with respect to the optical system, wherein the substrate and an image plane of the optical system are set to be in a predetermined positional relationship in at least a part of an area in an exposure area defined by the optical system, the method comprising the steps of:

measuring a height position of the substrate at a first measuring point which arrives at an image-forming area on the substrate prior to the part of the area in the relative movement direction;

measuring a height of the substrate at a second measuring point which arrives at the image-forming area on the substrate prior to the first measuring point in the relative movement direction; and

moving the substrate to a height position within a detectable range of a unit for measuring the height position

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of the substrate at the first measuring point, on the basis of a measured value obtained at the second measuring point.

19. The exposure method according to claim 18, wherein the first measuring point arrives at the image-forming area on the substrate prior to the exposure area.

20. The exposure method according to claim 18, wherein information about the height position of the substrate at the first measuring point and information about the height position of the substrate at the second measuring point are measured during a period in which the substrate is relatively moved with respect to the optical system while radiating the exposure light beam onto the substrate.

21. The exposure method according to claim 18, wherein a detection range, which is used when the height position of the substrate is measured at the second measuring point, is set to be wider than a detection range which is used when the height position of the substrate is measured at the first measuring point.

22. The exposure method according to claim 18, wherein the second measuring point includes a plurality of measuring points.

23. The exposure method according to claim 18, further
comprising the steps of:

controlling a position of the substrate concerning an
optical axis direction of the optical system on the basis of
an intermediate value between a maximum value and a minimum
value of the height position of the substrate measured at
each of the first measuring point and the second measuring
point; and

controlling an inclination angle of the substrate by
correcting an error caused when the position in the optical
axis direction is controlled, with a value of the height
position of the substrate.

24. The exposure method according to claim 18, wherein
the predetermined image is an image obtained by projecting a
pattern which is formed on a mask and which is used for
transfer.

25. An exposure apparatus which comprises an optical
system which radiates an exposure light beam onto a
substrate, and a substrate stage which relatively moves the
substrate with respect to the optical system, wherein a
surface of the substrate and an image plane of the optical
system are set to be in a predetermined positional
relationship in at least a part of an area in an exposure
area defined by the optical system, in order to form a

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predetermined image on the substrate, the exposure apparatus including:

a focus position-measuring unit which measures a height of the surface of the substrate at a measuring point disposed in front of the part of the area in the relative movement direction; and

a focusing stage which conforms the surface of the substrate to the image plane of the optical system in the exposure area of the optical system on the basis of a value measured by the focus position-measuring unit and information about an inclination angle of a running surface of the substrate stage.

26. The exposure apparatus according to claim 25, wherein the measuring point is set in front of the exposure area in the relative movement direction.

27. The exposure apparatus according to claim 25, wherein the focus position-measuring unit measures the height during a period in which the substrate is relatively moved with respect to the optical system while radiating the exposure light beam onto the substrate.

28. The exposure apparatus according to claim 25, further comprising an inclination angle-measuring unit which measures a value concerning the inclination angle.

29. The exposure apparatus according to claim 25, wherein:

the inclination angle-measuring unit includes a pitching-measuring unit which measures a pitching amount of the substrate stage with respect to the relative movement direction during exposure of the substrate; and

the focusing stage sets the surface of the substrate and the image plane of the optical system to be in the predetermined positional relationship in the exposure area of the optical system on the basis of a result of prediction of a variation amount concerning the height of the surface of the substrate based on a result of measurement of the pitching amount, and the height of the surface of the substrate measured by the focus position-measuring unit.

30. The exposure apparatus according to claim 28, wherein:

the inclination angle-measuring unit measures a height of a surface of a fiducial member which has good flatness and is arranged on the substrate stage at a plurality of positions within a movement stroke of the substrate stage; and

the exposure apparatus further comprises a calculating unit for the focusing stage, and the calculating unit stores a result of measurement performed by the inclination angle-measuring unit, and calculates the value concerning the

inclination angle of the running surface of the substrate

stage on the basis of the stored result of measurement.

31. The exposure apparatus according to claim 30,

wherein the fiducial member is supported at three points with

respect to the substrate stage.

32. The exposure apparatus according to claim 25,

wherein the predetermined image is an image obtained by

projecting a pattern which is formed on a mask and is used

for transfer.

33. The exposure apparatus according to claim 25,

wherein a plurality of measuring points for measuring the

height of the surface of the substrate are provided in a

direction substantially perpendicular to the relative

movement direction.

34. The exposure apparatus according to claim 33,

wherein the focusing stage controls an inclination angle of

the substrate concerning the direction substantially

perpendicular to the relative movement direction on the basis

of a result of measurement performed by the inclination

angle-measuring unit.

35. An exposure apparatus which comprises an optical

system which radiates an exposure light beam onto a substrate, and a substrate stage which relatively moves the substrate with respect to the optical system, and which forms a predetermined image on the substrate, the exposure apparatus including:

a measuring unit with a fiducial member having good flatness arranged on the substrate stage, which measures at least one of a rolling amount of the substrate stage, a pitching amount of the substrate stage, and a displacement amount of the substrate stage in an optical axis direction of the optical system at a plurality of positions within a movement stroke of the substrate stage; and

a focusing stage which stores a result of measurement performed by the measuring unit and which corrects at least one of a running direction of the substrate stage and a height of a surface of the substrate on the basis of the result of measurement during exposure for the substrate.

36. The exposure apparatus according to claim 35, wherein the fiducial member is supported at three points with respect to the substrate stage.

37. The exposure apparatus according to claim 35, wherein the focusing stage determines and stores a variation value of the pitching amount and a variation value of the rolling amount from the result of measurement of the rolling

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amount of the substrate stage, the pitching amount, and the displacement amount in the optical axis direction of the optical system; the rolling amount of the substrate stage, which is detected during the exposure for the substrate, is corrected on the basis of the variation value of the rolling amount; and the pitching amount of the substrate stage, which is detected during the exposure for the substrate, is corrected on the basis of the variation value of the pitching amount.

38. The exposure apparatus according to claim 35, wherein:

the measuring unit measures straightness of the substrate stage in the running direction by a fiducial mark formed on the fiducial member having the good flatness arranged on the substrate stage; and

the focusing stage corrects any discrepancy of the substrate stage in the running direction during the exposure for the substrate on the basis of a result of measurement of the straightness.

39. The exposure apparatus according to claim 35, wherein the predetermined image is an image obtained by projecting a pattern which is formed on a mask and is used for transfer.

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40. An exposure apparatus comprising an optical system which radiates an exposure light beam onto a substrate, and a substrate stage which relatively moves the substrate with respect to the optical system, wherein a surface of the substrate and an image plane of the optical system are set to be in a predetermined positional relationship in at least a part of an area in an exposure area defined by the optical system, in order to form a predetermined image on the substrate, the exposure apparatus including:

a first focus position-measuring unit which measures a height position of a surface of the substrate at a first measuring point disposed in front of the part of the area in the relative movement direction;

a second focus position-measuring unit which measures a height position of the substrate at a second measuring point set in the vicinity of the first measuring point; and

a focusing stage which allows a height of the surface of the substrate to be included within a detectable range of the first focus position-measuring unit on the basis of a result of measurement performed by the second focus position-measuring unit.

41. The exposure apparatus according to claim 40, wherein the first measuring point is set in front of the exposure area in the relative movement direction.

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42. The exposure apparatus according to claim 40, wherein the first and second focus position-measuring units measure the height during a period in which the substrate is relatively moved with respect to the optical system while radiating the exposure light beam onto the substrate.

43. The exposure apparatus according to claim 40, wherein the second measuring point is arranged in front of the first measuring point in the relative movement direction.

44. The exposure apparatus according to claim 40, wherein a detection range of the second focus position-measuring unit is wider than a detection range of the first focus position-measuring unit.

45. The exposure apparatus according to claim 40, wherein second measuring point includes a plurality of measuring points.

46. The exposure apparatus according to claim 40, wherein the focusing stage controls a position of the substrate in an optical axis direction of the optical system on the basis of an intermediate value between a maximum value and a minimum value of the height position of the substrate measured at each of the first measuring point and the second measuring point, and controls an inclination angle of the

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substrate by correcting an error brought about when the position concerning the optical axis direction is controlled, with a value of the height position of the substrate.

47. The exposure apparatus according to claim 40, wherein the predetermined image is an image obtained by projecting a pattern which is formed on a mask and is used for transfer.

48. The exposure method according to claim 1, wherein the image is formed on the substrate during the relative movement with respect to the optical system.

49. The exposure method according to claim 12, wherein the image is formed on the substrate during the relative movement with respect to the optical system.

50. The exposure method according to claim 18, wherein the image is formed on the substrate during the relative movement with respect to the optical system.

51. The exposure apparatus according to claim 25, wherein the image is formed on the substrate during the relative movement with respect to the optical system.

52. The exposure apparatus according to claim 35,

wherein the image is formed on the substrate during the relative movement with respect to the optical system.

53. The exposure apparatus according to claim 40, wherein the image is formed on the substrate during the relative movement with respect to the optical system.

54. A device in which a predetermined pattern is formed, wherein the device is produced with the exposure method as defined in claim 1.

55. A device in which a predetermined pattern is formed, wherein the device is produced with the exposure method as defined in claim 12.

56. A device in which a predetermined pattern is formed, wherein the device is produced with the exposure method as defined in claim 18.